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Panelized High Performance Multilayer Insulation

A means was required to cover flight type liquid hydrogen tankage of space vehicles with a removable, structurally compatible, lightweight, high performance cryogenic insulation capable of surviving prelaunch, launch, and extended space mission environments. A bumper jacket over the insulation was also required to protect the tankage against micrometeoroid damage in the space environment.

To realize these ends, there have been developed multilayer insulation coverings in which low conductivity foam spacers are interleaved between layers of quarter mil aluminized polymer film radiation shields. This forms a composite structure having exceptional cryogenic insulation properties, good venting characteristics, and high energy particle absorption qualities. When such multilayer insulation structures are faced with a high density jacket material, capable of shattering micrometeoroid particles, the assembly provides a joint cryogenic insulation and micrometeoroid protection system that is useful for cryogenic fueled tankage of space vehicles.

Notes:

1. While application of high performance, multilayer insulation materials to cryogenic fluid ground

storage tanks and mobile tankers is well known and widely used, commercially available devices are not suitable for the space environment.

2. In hypervelocity testing, the composite proved adequate to stop 17-mg glass projectiles at 20,000 to 25,000 fps.
3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B68-10031

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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